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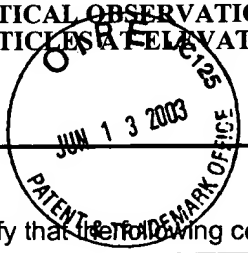
Serial No. 09/630,479	Filing Date 08/02/2000	Examiner BARTH	Group Art Unit 2713

Invention: OPTICAL OBSERVATION DEVICE AND METHOD FOR OBSERVING ARTICLES AT ELEVATED TEMPERATURES



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Chang

Serial No.: 09/630,479 Art Unit: 2713

Filed: 08/02/2000 Examiner: Barth

For: OPTICAL OBSERVATION DEVICE AND METHOD FOR OBSERVING ARTICLES AT ELEVATED TEMPERATURES

Docket No.: 63,937-104

Mail Stop Appeal Brief-Patents
Commissioner for Patents
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APPEAL BRIEF

Dear Sir/Madam:

Appellant submits, in triplicate, the following Appeal Brief pursuant to 37 C.F.R. § 1.192 for consideration by the Board of Patent Appeals and Interferences. **Assignee/Appellant asserts a claim of entitlement to small entity status.** Please charge the cost of filing the opening brief in support of appeal, namely $160.00 (small entity), as required under 37 C.F.R. § 1.17(c) to Deposit Account No. 04-2223. No oral argument is requested. Please charge any additional fees or credit any overpayment to the same account.

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I. REAL PARTY IN INTEREST

The real party in interest is the Assignee, OG Technologies, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to the Appellant, Appellant's legal representative, or Assignee, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-22 are pending and remain rejected. The Appellant hereby appeals the rejection of claims 1-22.

IV. STATUS OF AMENDMENTS

No amendment has been filed subsequent to the final rejection.

V. SUMMARY OF INVENTION

In one aspect, the present invention provides an optical system for characterizing the surface of a high-temperature object.[1] The object has a characteristic, temperature-dependent, dominant, self-emitted electromagnetic radiation (EMR) spectrum.[2] The optical system has an illumination source which projects electromagnetic radiation toward the high-temperature object (applied EMR).[3] The invention further includes an EMR detector for selectively detecting a spectrum component of the applied EMR.[4] The applied electromagnetic radiation strikes the high-temperature object and is reflected toward the EMR detector along with the self-emitted electromagnetic radiation and any ambient (background) electromagnetic radiation.[5] At least one component of the reflected, applied EMR (which interacts with the surface of the high-temperature object) is selectively detected by the EMR detector.[6] In one aspect, this selectively identifiable, reflected EMR comprises EMR having a wavelength which is determined (selected) on the basis of the temperature of

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[1] See page 4, lines 3-4 of the present specification.

[2] See originally presented claim 1.

[3] See page 4, lines 4-6 of the present specification.

[4] See originally presented claim 1.

[5] See page 4, lines 6-8 of the present specification.

[6] See page 4, lines 8-10 of the present specification.

the object (and material)[7]; that is, based on wavelength it is distinguishable from the predominant self-emitted EMR and background EMR.[8] In this manner, detection of the reflected EMR provides an image of the high-temperature object which simulates the object surface at low temperatures (i.e. below that producing any significant self-emitted EMR).[9] See Exhibit A (Appellant refers to its product as Hot Eye).

In another aspect, the component of the reflected, applied EMR which is identified by the detector has a distinctive signature produced by modulating the applied EMR.[10] In this aspect, the optical system of the present invention further includes an EMR modulator.[11]

In still another aspect, the present invention is implemented in a hand-held device.[12]

In still yet another aspect, the optical system of the present invention further includes an airflow controller to provide air at a preselected temperature around the hot object to decrease a temperature gradient to said object to remove air density distortions.[13]

VI. ISSUES

The issue is whether claims 1-22 are patentable under 35 U.S.C. § 103(a).

VII. GROUPING OF CLAIMS

Appellant contends that the claims of the present invention do not stand or fall together. In particular, the following groups of claims are separately patentable:

Group 1: Claims 1-5, 7, 9-10 and 17-18 stand together.

Group 2: Claims 15-16 stand together.

Group 3: Claims 6, 8 and 20 stand together.

Group 4: Claims 11-13 and 19 stand together.

Group 5: Claims 14 and 21-22 stand together.

The claim(s) in each group is (are) separately patentable from the claim(s) in any other group.

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[7] See page 7, lines 1-36 through page 8, lines 1-29 of the specification.

[8] See page 4, lines 10-13 of the present specification.

[9] See page 4, lines 13-15 of the present specification.

[10] See page 4, lines 16-17 of the present specification.

[11] See page 4, lines 17-18 of the present specification.

[12] See page 4, line 19 of the present specification.

[13] See page 11, lines 15-19 of the present specification.

VIII. ARGUMENTS

A. Argument Directed to the Allowance of Selected Groupings of the Claims

Claims 1-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over (i) *Milnes* (US 3,187,185); (ii) *Milnes* in view of *King* (US 5,995,008); and (iii) *Milnes* in view of *Fishman* (4,744,407). For the reasons to appear hereinafter, claims 1-22 are patentable, and thus the rejections under 35 U.S.C. § 103 should be reversed, and a *Notice Allowance and Issue Fee Due* should be mailed.

1. Argument for Allowance of the Claims of Group 1 (Claims 1-5, 7, 9-10 and 17-18)

As set forth on pages 2-6 of the Final Office Action (dated February 5, 2003), claims 1-10, 15-18 and 20 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over *Milnes*. To support the conclusion that the claimed invention is directed to obvious subject matter, the Federal Circuit has held that the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. *See In re Vaeck*, 947 F.2d. 488, 20 U.S.P.Q. 2d 1438, 1442 (Fed. Cir. 1991). Likewise, the Board has held that the claimed invention is directed to obvious subject matter only if either the references expressly or implicitly suggest the claimed invention, or a convincing line of reasoning is presented by the Examiner as to why an artisan would have found the claimed invention to have been obvious in light of the teachings of the cited references. *See Ex parte Clapp*, 227 U.S.P.Q. 972, 973. (Bd. Pat. App. & Inter. 1985).

A conclusion of obviousness for the above-cited claims cannot be supported because (i) *Milnes* does not teach or suggest any one or more of the rejected claims; and (ii) the Examiner's line of reasoning in the final Office Action as to why one of ordinary skill in the art would find the invention obvious is conclusory and is not convincing.

Independent claim 1 is directed to an optical system for producing an image of a surface of an object wherein the object has "a characteristic, temperature-dependent, self-emitted EMR spectrum." Claim 1 further recites that the "reflected component of said projected EMR has a wavelength different than said self-emitted, dominant EMR spectrum" and that "said projected electromagnetic radiation ***having a wavelength which is selected as a function of object temperature and material***." For at least the reasons set forth below, Appellant respectfully submits that *Milnes* does not teach these recitations. At most, *Milnes*

teach distinctions based on an operator's visual perception of color, not on a machine vision requirement of distinction based on wavelength. Moreover, there are several inconsistencies in *Milnes* that place into serious doubt whether *Milnes* is even enabling as to a system which makes distinctions based on visual perception of color. *Milnes* does not appreciate the problem of temperature dependent self-emitted radiation, much less provide or suggest any solutions. Without such recognition of the problem of temperature-dependent radiation, it cannot be said that *Milnes* makes obvious a system where a projected radiation is selected based on object temperature and material type. According to the invention, these factors are principal is determining the envelope of self-emitted radiation, and accordingly, what wavelength(s) can be selected so as to be distinct from these self-emitted wavelengths. These points will be taken up in turn.

Temperature of the Object. The main objective of *Milnes* is to achieve (1) "rapid handling" and (2) "non-contact" for the "surface contour and/or thickness" of the target object. (Col. 1, Lines 9-15; Col. 1, Lines 19-24). It is therefore not surprising that temperature is never a factor in *Milnes*' invention. *Milnes* never specifies a temperature or a temperature range of the "workpiece P"—the steel bar (slab or bloom). Without a recognition for and an appreciation of temperature as a factor that shapes the self-emitted EMR envelope of wavelengths of a hot object, Appellant respectfully contends that the disclosure of *Milnes* does not reasonably teach projected radiation having a wavelength which is ***selected as a function of object temperature and material*** as positively claimed. *Milnes* does not recognize temperature-dependent, self-emitted EMR or its problems, much less disclose or suggest any solutions. The Office relies on the mention in *Milnes* of the term "red-hot". In this regard, the Office has stated:

> *Milnes* further discloses: (iv) that the system may project a different wavelength EMR upon the object than the object's self-emitted wavelength (col. 1, lines 65-69). The example provided therein, is one exemplary embodiment in which the sample is glowing red-hot (*i.e.*, self-emitting in the red spectrum of visible light), and wherein a blue or ultra-violet beam may be incident upon it, such that the self-emitting EMR is distinguishable. . . . In this context, in one exemplary embodiment the "dominant" self-emitting radiation in *Milnes* is red, and such is clearly temperature dependant, since the metal will emit differently at different temperatures in other embodiments (*i.e.*, different temperature configurations). Applicant has argued that the example of the color red provided in *Milnes* suggests that human eyesight is involved, and therefore that the colors perceived by human is relevant. The Examiner disagrees, since *Milnes* clearly disclose a machine vision apparatus and

> method (*i.e.*, using cameras for sensing and analysis), in which human color perception is not relevant.[14]

Initially, Appellant points out that a television camera 11 and a television 12 are provided for viewing the moving steel blooms. It is well known to provide a television so that humans can watch what is being displayed. Human eyesight is therefore involved. Appellant's arguments as to "color" are therefore relevant, contrary to what is stated above by the Examiner.

Additionally in response, Appellant states that *Milnes* does not say glowing red-hot. Appellant has reviewed *Milnes* and do not find "glowing" used in connection with "red hot."

As to the meaning of "red hot" in *Milnes*, Appellant does not believe it means "temperature-dependent, dominant, self emitted EMR spectrum" (as claimed) of the type that exists at very high temperature. There are indicia in the *Milnes* patent to support the contention that the reference to "red hot" is simply a layman's reference to "hot". First, in *Milnes*, the background (*i.e.*, table 2 upon which the workpiece P rests) for the steel slab being inspected needs to be colored in a contrasting color relative to the projected beam color. This cannot be accomplished if the steel bar (workpiece P) is "red hot" meaning hot enough to have self-emitted EMR. The Board's attention is drawn to *Milnes* at column 1, lines 66-71:

> The color of the beam of light 6 is selected so that it contrasts with the color of the workpiece P. For example, if the workpiece P is red-hot steel, a blue or ultraviolet beam is preferred. The color of the surface of the table 2 is selected to contrast with the color of the beam 6.

While this requirement in *Milnes* is possible to implement when a workpiece is simply colored in red but otherwise not "red hot" as that term is generally used, Appellant respectfully submits that this is not possible for applications with a workpiece with a self-emitted, temperature-dependent RED color due to the very high temperature involved. Up to today, there is no such paint or coloring scheme[15] with arbitrarily selectable color that can withstand the contact of a self-emitting "red-hot" workpiece (800° C or hotter). Therefore, Appellant does not believe that the term "red-hot" in *Milnes* can reasonably be interpreted to

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[14] Final Office Action (February 5, 2003), at pages 2-3.

[15] Based on the knowledge in the steel and forging industry. The inventor is currently working with MACSTEEL (Jackson, MI), Timken Steel (Canton, OH), Inland Steel (East Chicago, IL), Charter Steel (Saukville, WI) and the American Iron and Steel Institute (Washington D.C.) in search of a painting technology that can survive the self-emitted "red-hot" (hotter than 800C) condition.

mean "glowing" red hot (*i.e.*, "dominant self-emitting radiation") as contended by the Office. This "red" could be either a paint or other color added onto the workpiece and the "hot" is a temperature such as, for example, 100° C, or simply a loosely used lay term meaning "hot."

As to this apparent inconsistency in *Milnes* regarding the contrast between the table and the steel workpiece P, the Office has stated that (1) such contrast is merely an ancillary feature, and (2) in any event, the table/rollers could be ceramic in order to provide the color contrast:

> Figure 7 in *Milnes* illustrates the workpiece P moving along a conveyor system comprised of rollers, the material composition of which is not specified, but could quite certainly be formed of a ceramic shell. Ceramics have been known since antiquity to withstand high temperatures (*i.e.*, well over 1000° C), and may be found in some variety of colors. It is not necessary that the entire and continuous color spectrum be available from ceramics to suit the system disclosed in *Milnes*, merely enough colors to allow for adequate contrast in response to the self emitted radiation. Moreover, new generations of ceramics have been engineered in the past decades to withstand even higher temperatures and stresses than had been known historically, and are now used in extraordinarily diverse applications. Therefore, painting the conveyor would not be necessary to achieve contrast if ceramics were used.[16]

Appellant responds by stating that the contrast of the table on which the steel slab P is conveyed is not "merely ancillary" but in fact is indispensable to the invention of *Milnes*. Without having a table with a color that contrasts with the color of the projected beam, there would be no way for the operator to discern the depth of the slab (see Figure 2 of *Milnes* for a good example of this: beam 6a is on the table and beam 6b is on the slab). The whole theory in *Milnes* is one involving trigonometry and the ability to see the beam on the top surface of the slab as well as the beam on the table, and taking the difference in distance between the two. Failing this, the invention of *Milnes* fails. Appellant does not see how such a critical part of *Milnes* could be characterized as "merely ancillary".

In addition, Appellant responds by stating that ceramics cannot be used. The Office has committed clear error by contending that the material handling machinery in the steel mill of *Milnes* could be formed of ceramics. This line of reasoning is an effort to explain the unexplainable inconsistencies in *Milnes* noted above regarding color of the table on which the steel slabs are conveyed. While ceramics can withstand high temperature, they can only be used to hold stationary hot objects or liquid hot objects. Ceramics cannot be used to handle

[16] Final Office Action (February 5, 2003), at pages 12-13.

moving, solid and heavy objects for at least two reasons: (1) Ceramics are relatively strong in compression but very weak in tension. In the case of "hit by a moving object" situations, tension forces dominate. Therefore, ceramics are not suitable for forming the table to support the "moving" of the heavy steel blooms. (2) The steel blooms in *Milnes* are discrete hot objects. When the bloom is in contact with the table, the table is heated up. Between the blooms, the table will cool down. This heating/cooling cycle is very destructive to materials like ceramics. Cracks will quickly occur. Moreover, the regions that are directly in contact with the hot blooms will heat up faster than other regions. Uneven local heatup is also destructive to ceramics. Even a temperature difference of 100° C, such as by pouring boiling hot water into a mug, can crack the ceramic mug. The temperature differences of 1000° C (as in the case of hot blooms of *Milnes)* present even tougher conditions. And, in any event, the Office has provided nothing but unsupported speculation as to the whole ceramic issue. This cannot form the basis of a proper rejection under the Federal Patent laws.

Milnes also states among other things that it can use UV light to contrast with red-hot steel; however, UV is impractical, which further supports the contention that "red hot" in *Milnes* does not mean hot enough for self-emitted EMR. *Milnes* discloses "means for filtering out all frequencies of light other than the ultraviolet energy situated between the images and the said measuring means". Self-emitted EMR from a truly glowing "red hot" piece of steel could include ultraviolet energy in some cases. Therefore, the *Milnes* reference is more consistent with a red colored piece of steel (where the above quoted "means for filtering' could be more effective), or just a "hot" piece of steel having a temperature less than that required for self-emitted EMR. This passage is less consistent or inconsistent with an interpretation where "red hot" means glowing (self-emitted EMR) red hot, where in such a case, the "means for filtering" would not address the problem of self-emitted EMR obstructing the view of such a hot object because it would not filter out all the self-emitted EMR. The Office has responded to this argument by stating that:

> In addition, *Milnes* states that the incident radiation may be in the UV spectrum (col. 1, line 69), and assuming that the conveyor doesn't emit too highly in the UV range as it gains temperature, virtually any conveyor color would contrast with the incident UV light. It should be emphasized that the feasibility or obviousness of the above suggestion is not dispositive, since the contrast between the workpiece and the conveyor has been deemed to be merely ancillary.[17]

[17] Final Office Action (February 5, 2003), at page 13.

Again, Appellant contends that the contrast between the workpiece and the conveyor is not merely ancillary. The Board's attention is respectfully directed to *Milnes* at column 2, lines 39-42:

> In is seen that the object, the dimensions of which are to be measured, must rest upon the table 2 ***because all measurements are made with respect to the image of the beam 6 on the table 2***. (emphasis added).

Clearly, without contrast between the color of the beam and the color of the table, the entire invention of *Milnes* fails. The Office must consider *Milnes* as whole, including all of its inconsistencies, and attempt to reconcile them in arriving at what it really teaches, if anything. The Office has not done this.

Moreover, UV cannot be used, contrary to what is stated in *Milnes* and the position of the Office. UV is a strange radiation in that most material will absorb, instead of reflect, UV radiation. Steel is a material that will absorb UV. When projecting UV radiation on steel, the radiation will interact with steel and a process known as ablation will occur. The steel atoms will be converted into ions by UV. In this case, the UV radiation, which is the external illumination proposed in *Milnes*, will not be reflected by truly glowing red-hot steel and thus the imager (camera) can not receive the UV radiation. Thus, *Milnes*, when referring to red-hot, does not mean glowing red hot for this reason as well. Therefore, the relevant claim limitations noted above as to self-emitted EMR are not taught or suggested.

Additionally, while *Milnes* describes an application in a steel rolling mill, not all metal in steel rolling mills is hotter than 800° C (at which temperature steel starts to radiate on its own visible light). The Office had stated that *Milnes* discloses a system in which an object, "such as high-temperature metal in a metal foundry, is at such temperature that it will have a self-emitted EMR, described therein as "red-hot steel. (col. 1, line 69)."[18] There are more cold rolling mills, whose working temperature is no higher than 500° C than hot rolling mills. One cannot infer from the context of a steel rolling mill alone that the workpiece described therein is hot enough to have self-emitted EMR.

In sum, Appellant respectfully submits that the Office has placed undue emphasis on the wording "red hot" in *Milnes* as teaching a hot object having "a characteristic, temperature-dependent, self-emitted EMR spectrum" as claimed.

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[18] Final Office Action (February 5, 2003), at page 10.

Color does not equal Wavelength.[19] Even assuming for purposes of argument only that the term "red-hot" means that the steel bar in *Milnes* is hot enough to have self-emitted EMR, the claimed approach of distinguishing projected EMR from self-emitted EMR based on wavelength is novel and non-obvious compared to the approach disclosed in *Milnes* of using color contrast. Color contrast cannot meet the limitation that the "reflected component of said projected EMR has a wavelength different than said self-emitted, dominant EMR spectrum" or that the "projected electromagnetic radiation having a wavelength which is selected as a function of object temperature and material" both as positively claimed.

Color is "the aspect of things that is caused by differing qualities of the light reflected or emitted by them." "It may be defined in terms of the observer (sense A) or of the light (sense B): A. The appearance of objects or light sources described in terms of the individual's perception of them, involving hue, lightness, and saturation for objects and hue, brightness, and saturation for light sources. B. The characteristics of light by which the individual is made aware of objects or light sources through the receptors of the eye, described in terms of dominant wavelength, luminance and purity."[20]

This definition teaches that color does not equal wavelength. There are other factors such as intensity (brightness or luminance) and purity that define color. "Different in color" cannot be directly translated to "different in wavelength." Also, color is an interpretation by eyes, not an absolute measurement. One wavelength can yield different colors and one color can contain many different wavelengths. For instance, a 550-nm radiation at a moderate intensity appears green to a normal human eye. A 550-nm radiation at a strong intensity appears WHITE to a human eye. Such phenomenon is documented in the model of color solid. Also, both 620-nm radiation and 680-nm radiation appear to be RED to most human eyes.

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[19] Color does not indicate wavelength, particularly in machine vision. Photo sensors, such as CCD or the like, are "color" blind. They are sensitive to wavelength and intensity only. Therefore the notion of "color" in machine vision can only be defined by "color filters" even in the case of state-of-the-art color cameras. This is consistent with the disclosure of *Milnes* (Col. 1, lines 71-72). When selecting the color of the filter, this is a human eye color. "Color filters" are not "wavelength filters" in the optical industry. A color filter, such as a commonly used dicroic color filter, can block and/or pass more than one band of wavelengths. For instance, a BLUE filter can pass wavelengths from 435 to 480 nm and wavelengths from 690 to 750 nm. Color can be defined not only by pure colors like red-green-blue (RGB), but also, for example in machine vision color can also be defined by the complement colors (YCM) of RGB. The complement color filters contain at least two bands of wavelengths. Color can also be defined by Hue, Saturation and Brightness in machine vision.

[20] The American Heritage Dictionary.

The word "contrast" reflects the fact of "difference." Any two objects that are different in a certain perspective are considered "contrasting" each other. Based on this, "color contrast" means "difference in color." This "color contrast" notion as taught by *Milnes* is distinctly different to the approach of the present invention, which is based on wavelengths separation.

Color is a perception of human eyes, as a result of stimulus given to the eyes by the radiation at certain wavelengths. It does not have a measurable means of defining a color and it has a very limited spectrum range (from 400 nm to 700 nm). Accordingly, it is respectfully submitted that mere mention of a "color contrast" in *Milnes* does not anticipate the specific recitations of distinct wavelengths of projected EMR versus self-emitted EMR, and in particular the recitation that the "projected electromagnetic radiation having a wavelength which is selected as a function of object temperature and material."

Color Contrast Can Fail. The teaching of using "contrast color" does not solve all the problems addressed by the present invention. *Milnes* uses the phrase "red-hot" in the example. This phrase is merely a loosely defined perception of *Milnes*. No specific temperature and or size of the hot object is attached to this description. A hot object (incandescent radiation) can have many different appearances. The "color" of a hot object can vary in accordance with the temperature and/or the size of the object. If "red-hot" is interpreted as an object the self-emitted radiation, then the phrase "red-hot" may cover a much broader spectrum of wavelength contents than simply "RED."

That is, a "red-hot" object can indeed appear "**white-hot**," if the size is large (intensity of radiation is proportional to the solid angle created from the projection of the area of a hot object onto the receptors of the eye). This is an important point, because two different, hot objects of the same material and temperature will have substantially the same self-emitted EMR envelope, but may appear either "red" or "white" based on size differences. Of course, the "white hot" object may in fact be "hotter" (the hotter the object, the "whiter" the color), but this example illustrates how the notion of color contrast in *Milnes* is not the same as wavelength separation as positively claimed in the present invention. In sum, "color" is a collective perception of dominant wavelength, luminance and purity. If the wavelength and purity are held same, a stronger intensity (luminance) could yield a different color.

While blue or ultraviolet (as a color) contrasts "red," it may not contrast "white," the kind of white resulting from either higher temperature or stronger intensity (larger size), or both. Either blue or ultraviolet (as a color) can not be separated from the self-emitted "white" radiation.

Furthermore, the color contrast approach disclosed in *Milnes* cannot work for a "white-hot" object. Based on *Milnes*' teaching, a light beam with a contrast color should be used to illuminate the "white-hot" object. What is the "contrast color" of "white"? It is commonly known that "**black**" contrasts "white." Therefore, *Milnes* would suggest using "**black**" light to illuminate a "white-hot" object. This however can not be practiced in real life. Again, as noted above, "color" does not equal to "wavelength." At most, *Milnes* teaches distinguishing "red-hot" color of the workpiece P from the projected beam of light based on color, not wavelength.

For example, the specification of the present invention, as originally submitted, disclose that using "wavelength separation" to distinguish the externally projected and self-emitted radiation can mean "using RED color to contrast RED color." Table 1 on page 6 of the present application provides the "longest usable wavelength," as derived from the radiation equations stated on pages 7 and 8. Table 1 is also plotted on FIG. 2. Consider an object at 800° C or cooler. Such object, according to the "IRON-CARBON/CEMENTITE PHASE DIAGRAM," published by ASM International and attached as Exhibit B to Appellant's Reply dated January 6, 2003, is radiating a dark red (at the borderline of visible light), also attached hereto as Exhibit B. The present invention disclosed in Table 1 that "any wavelength that is shorter than 700 nm, say 625 nm, can be used" (longest usable is 700 nm). That is, the present invention teaches that an externally projected visible light radiation can be used to contrast the self-emitted radiation from an object at this temperature. In the present invention, BOTH the self-emitted EMR and the projected EMR are RED in color, which is clearly not taught by *Milnes*. Note that the object is in RED and the illumination can be in RED (625 nm). This is clearly not taught by *Milnes*.

No Definition from Milnes. There is no qualification given by *Milnes* as to (a) what kind of contrast, and (b) how strong of contrast are needed for *Milnes*' invention to work. One may question its enablement.

Milnes does not disclose that the self-emitted EMR is temperature dependent. While one can conclude after reading Appellant's specification that many materials such as steel,

ceramics, etc. have this characteristic as a physical property, this is not the same as the *Milnes* reference disclosing this feature. Without a recognition of this physical property, *Milnes* cannot be said to teach the concept of selecting the projected illumination (the wavelength(s) thereof) as a function of temperature and material of the hot object, as positively claimed. For at least these reasons, Appellant respectfully submits that the rejection based on *Milnes* should be reversed.

2. Argument for the Allowance of the Claims of Group 2 (Claims 15-16)

Claims 15-16 depend from claim 1 and therefore contains all of the limitations of claim 1. Consequently, the arguments presented above in support of the patentability of claim 1 (and its respective grouped claims) are incorporated hereunder in support of claims 15-16. However, this claims recite the further limitations of a "frequency modulator"/"demodulator" and "means for pulsing," respectively, which is not taught or suggested.

Claims 15-16 capture alternative embodiments suitable for inserting a "signature" discernable or distinguishable in some way from the "temperature-dependent, dominant, self-emitted EMR spectrum" of the hot object. The Office states without any support that it is "commonly known in the field of optics, that modulation of the incident beam, and demodulation of the reflected beam received may be used to distinguish background radiation, or in this case self-emitted radiation, from the source light incident upon the object." The Office has not cited to any reference to support the general proposition, much less the specific proposition that use of the recited structure can be used in the context of a hot object having "temperature-dependent, dominant, self-emitted EMR spectrum" as positively claimed. The Office has not carried its burden of persuasion and has not established a prima facie case. Accordingly, Appellant respectfully requests that the rejection be reversed.

3. Argument for the Allowance of the Claims of Group 3 (Claims 6, 8, 20)

Claims 6, 8 and 20 depend from claim 1 and therefore contains all of the limitations of claim 1. Consequently, the arguments presented above in support of the patentability of claim 1 (and its respective grouped claims) are incorporated hereunder in support of claims 6, 8 and 20. However, this claims recite the further limitations of a "wherein said laser projects a zone illumination," "wherein said laser projects structured illumination" and "wherein said

projected EMR impinges a predetermined surface area of said hot object," respectively, which are not taught or suggested.

Claims 6, 8 and 20 recites area imaging features of the invention. *Milnes* at most discloses a line, not an area. Nor would it be obvious to modify *Milnes* from a line source to an area imaging, since that would destroy a feature of the *Milnes* invention, namely, the visual simplicity of observing with the naked eye on television 12 thereof (or photographs if television 12 is not used) a "measurement line" relative to a "reference line " (on the table 2) to assess workpiece depth and surface and contours.

The Office in this regard has stated that, as to the features of claim 6 and 8, that such limitations "are commonly known" and that therefore such substitution would be obvious.[21] This represents clear error. Appellant submits that the foregoing represents reversible error as to the legal analysis. The claim must be considered as a whole. Determining that a claim is "obvious" based on the perceived obvious of a particular limitation engages in an incorrect legal analysis and is therefore improper, and should be reversed. The correct legal analysis involves, at least, whether it would be obvious to modify *Milnes*, for that is the patent reference that the Office is saying is obvious to modify. As mentioned above, it would not be obvious to modify *Milnes* since that would destroy the reference (simplicity of operation), and/or change the basic principle of operation. See *In Re Gordon,* 733 F.2d 900, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984); *In Re Ratti*, 270 F.2d 810, 813, 123 U.S.P.Q. 349 352 (CCPA 1059).

As to claim 20, the Office has stated that the "image analysis scheme does not appear to hinge on such structured illumination, therefore alternatives embodiments in which a larger area were to be illuminated would have been obvious to those skilled in the art at the time of the invention. Moreover, the strict construction of the term 'area' to preclude a line of light as is disclosed in *Milnes* is not supported in the reference."[22] *Milnes* discloses just the use of lines, further describes the measuring relative differences between a measurement line relative to a reference line, and even refers to using a graduated template (Col. 2, lines 21-25). The Office contends that Appellant's interpretation of *Milnes* in this regard is "not supported". However, the Office bears the burden of showing that the Appellant is not entitled to a patent, not the reverse. Appellant has pointed to specific portions of *Milnes* in

[21] Final Office Action (February 5, 2003), at pages 5 and 6.

[22] Final Office Action (February 5, 2003), at page 8.

this regard and have given an explanation of why using "areas" or structured or zone illumination would destroy the apparent advantages and/or principle of operation of *Milnes*. The Office has not stated anything other than "commonly known" and "not supported" without analysis. The Office has not carried its burden of persuasion of establishing a prima facie case of obviousness. The rejections should be reversed.

4. Argument for the Allowance of the Claims of Group 4 (Claims 11-13 and 19)

As set forth in the Final Office Action, pages 8-10, claims 11-13 and 19 stand rejected under 35 U.S.C. § 103 as being unpatentable over *Milnes* in view of *King*. Claims 11-13 depend from claim 1 and therefore contain all of the limitations thereof. Likewise, claim 19 contains the same limitations argued above in connection with claim 1. Consequently, the arguments presented above in support of the patentability of claim 1 (and its respective grouped claims) are incorporated hereunder in support of claims 11-13 and 19.

In addition, however, the Office has not shown a suitable motivation or incentive to make a proper combination of *Milnes* and *King*. Specifically, the reasons given in support of the combination are: "to improve the imaging of high temperature objects" (claims 11-13) and "to achieve meaningful and more accurate results for later analysis" (claim 19). The reasons given are so broad that they would, if taken to its logical conclusion, support (and render unpatentable) any and all combinations of optical systems and components thereof. Appellant respectfully requests reversal of the rejection.

5. Argument for the Allowance of the Claims of Group 5 (Claims 14, 21-22)

Claims 14 and 21-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Milnes* in view of Fishman (US 4,744,407). Appellant respectfully overcomes this rejection.

As an initial matter, claim 14 depends from independent claim 1, and therefore includes all of the limitations thereof. Therefore, for at least the same reasons provided above in Appellant's response to the rejection of claim 1, Appellant respectfully submits that the rejection of claim 14 has been overcome. Appellant, however, also contends that claim 14, as well as claims 21-22, recite additional subject matter not taught in the art.

Claims 14 and 21-22 recite an airflow controller to provide "air at a preselected temperature to reduce a temperature gradient to remove air density distortion." Neither *Milnes* nor *Fishman* disclose this recitation.

The Final office action states on page 10, lines 13-16 that:

> The Specification at p. 11 of the Application states that such air flow controller "decreases the temperature gradient around the hot object," indicating *that cool air at a sufficient pressure to meet the desired flow rate would be introduced.* (emphasis added).

Appellant disagrees, however, with the inference taken by the Office (shown in italics above) as to what Appellant's own application indicates. "Decreasing temperature gradient" does not imply "decreasing temperature" for example, by using chilled air. A temperature gradient is the rate of temperature change in a given space. Decreasing the temperature gradient indicates making the temperature in the space uniform. Making the temperature uniform in a space may be achieved, in the case of a hot object, by heating up the space, as stated in the patent application that "air flow 43 will be at a pre-selected temperature." (Page 11 of the present specification, lines 16 and 17.)

In contrast, blowing "cool air" as contended by the Office can have an adverse effect on the hot object. In many applications, the cooling rate determines the microstructure of the final product. The cooling rate is a mechanism to control the final product property (a.k.a. heat treating). Claims 14 and 21-22 recite that the air is "at a preselected temperature to reduce a temperature gradient. . . ." This is not taught by *Fishman*.

The Final Office action[23] further states that:

> Although the language of *Fishman* does not explicitly state that the 'chilled air' reduces optical distortion, it is clear from the context of a camera imaging molten metals, that the temperature of the air serves this purposed, and term 'interference' as used in *Fishman* is intended to mean "optical distortion" as used in the instant claim. ... Therefore, *Fishman* suggests that when imaging an object at sufficiently high temperatures that optical distortion occurs, one would introduce chilled air passing the object at an appropriate flow rate to control such effects.

Appellant respectfully disagrees.

The Office need not have engaged in speculation as to *Fishman*, since *Fishman* expressly discloses that chilled or inert air is provided specifically for removing "fumes and

[23] Final Office Action (February 5, 2003), at pages 10-11.

dust" **NOT** reducing optical distortion by ***reducing a temperature gradient*** as claimed. The Board's attention is directed to column 4, lines 61-66 of *Fishman*:

> If desired, chilled air or inert gas, ... may be introduced into tube 70 through inlet 76 to generate a positive pressure in tube 70 to prevent **FUMES** and **DUST** from entering tube 70 and interfering with the vision of camera 66. (emphasis added).

Clearly, it is fumes and dust that are interfering with the vision of the camera in *Fishman*, not excessive temperature gradients leading to optical distortions, as claimed. Appellant respectfully submits that in *Fishman*, to the extent that the introduced airflow is "chilled," it is done so as to not melt or otherwise damage the camera due to hot air (*i.e.*, the camera is directly intermediate the airflow inlet and the molten metal in the mold). To the extent the airflow is "inert" it is done so to avoid chemical interaction with the surface of the molten metal. *Fishman* simply does not disclose introducing air "at a preselected temperature to reduce a temperature gradient to remove air density distortion". Without at least some recognition of the problem of temperature gradients, it cannot be said that *Fishman* would be in a position to control air "at a preselected temperature" in order to reduce such temperature gradients. In sum, reducing temperature is not the same thing as reducing temperature gradients. Therefore, for at least these reasons, it is respectfully requested that the rejections of claims 14, 21 and 22 over *Milnes* and *Fishman* be reversed.

IX. CONCLUSION

Any teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the available references, and not based on Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q. 2d 1438 (Fed. Cir. 1991). Furthermore, M.P.E.P. § 2142 states that:

> To establish a prima facie case of obviousness, three criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

None of the cited references suggest an optical system as recited in claims 1-22. Hence, the Examiner has clearly erred with respect to the patentability of the claimed invention. It is respectfully requested that the Board reverse the Examiner's rejection of all

pending claims, and hold that the claims are not rendered obvious by the cited reference(s). However, should the Board find the arguments herein in support of independent claims 1, 19 and/or 21 unpersuasive, the Board is respectfully requested to carefully consider the arguments set forth above in support of each of the independently patentable groups.

Respectfully submitted,

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By: _____

John W. Rees, Reg. No. 38,278
Dykema Gossett PLLC
39577 Woodward Avenue, Suite 300
Bloomfield Hills, MI 48304
(248) 203-0832
jrees@dykema.com